## Remarks

### Introduction

Applicant thanks the Examiner for carefully considering the subject application.

However, before addressing the claims in detail, Applicant believes that it would be useful to review several details of the application. The present application relates to a method of controlling valve lift mode for an internal combustion engine. In particular, the present application relates to changing valve lift profiles for a group of cylinders that are consecutive in the combustion sequence of the engine. Specifically, the inventor herein has determined that it is possible to create a larger valve mode transition window by changing the mode of a group of cylinders, consecutive in combustion sequence, while the valve actuation events of another group of cylinders, consecutive in combustion sequence, are about to begin or are underway. By controlling cylinders that are grouped in a consecutive combustion sequence, an activation window may be extended longer than the interval between cylinder events, (i.e., 720/number of cylinders). See page 8, lines 4-30, page 9, and page 10, lines 1-10, for example, of the specification.

Consequently, in one example, the valve lift mode change window increases from 110 crank angle degrees to 470 crank angle degrees. This increase in mode interval duration can reduce the possibility of valve actuator degradation because there may be additional time to complete a mode transition before a scheduled valve event begins.

In addition, Appendix A has been included at the end of this reply to provide the Examiner with a reference of some common engine cylinder number and combustion sequence schemes.

**Rejection of Claims 8 and 12-17 under 35 U.S.C. 102(b)**

The Examiner has rejected claims 1 and 12-17 under 35 U.S.C. 102(b) as being anticipated by Voss et al., U.S. Patent 6,332,455. Applicant respectfully submits that Voss et al. do not teach all of the limitations of Claim 8.

Claim 8 recites:

> A control method for selecting and adjusting valve lift in an internal combustion engine with at least two cylinder groups, the method comprising:
> a first mode of operation to operate at least one valve in said first group of cylinders, and at least one valve in said first group of cylinders in a first valve lift mode, said first group of cylinders comprised of cylinders that are consecutive in a combustion sequence of said engine;
> a second mode of operation to operate said at least one valve in said first group of cylinders in a second valve lift mode;
> a third mode of operation to operate at least one valve in a second group of cylinders, said second group of cylinders comprised of cylinders that are consecutive in a combustion sequence of said engine, said second group of cylinders different from said firs group of cylinders;
> a fourth mode of operation to operate said second group of cylinders in a second valve lift mode; selecting between said first and said second modes of operation during a crank angle interval where valves in said second cylinder group are opened and closed, and activating said selected mode; and
> selecting between said third and said forth mode of operating during a crank angle interval where valves in said first cylinder group are opened and closed, and activating said selected mode.

The Examiner states that "Voss discloses... a first mode of operation to operate at least one valve in a first group of cylinders, said at least one valve in said first group of cylinders in a first valve lift mode, said first group of

cylinders comprised of cylinders that are consecutive in a combustion sequence of said engine (see figure 1, numeral 8; figure 2)". Figure 1 appears in Voss et al. as is show below:

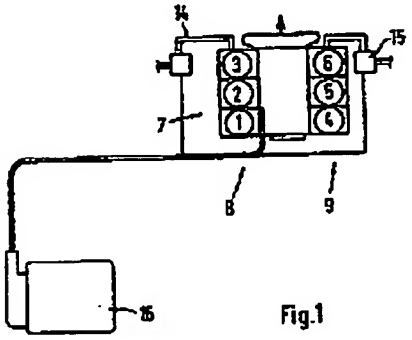

Fig.1

In addition, the Examiner goes on to state that "...said second group of cylinders comprised of cylinders that are consecutive in a combustion sequence of said engine, said second group of cylinders different from said first group of cylinders (see figure 1, numeral 9; figure 2)".

Figure 2 appears in Voss et al. as is shown below:

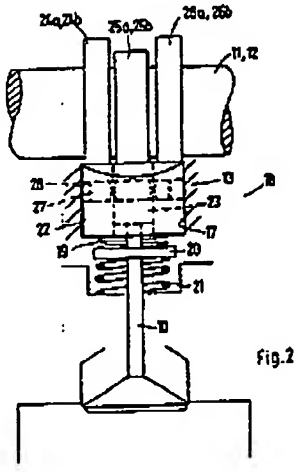

Fig.2

While it is not entirely clear, Applicant assumes that the Examiner is asserting that the cylinder that are consecutively labeled (e.g., 1-2-3) are therefore consecutive in a combustion sequence. However, such is not necessarily shown by Voss et al. Rather, this appears to be nothing more than mere labeling for identification. In fact, Applicants can find no disclosure in Voss et al. that supports the conclusion that either group of cylinders "are consecutive in a combustion sequence of said engine", which is specifically stated in Applicant's claim.

Applicant would also like to point out that this conclusion is confirmed by typical cylinder numbering schemes and combustion sequences (firing order), such as defined in the "Bosch Automotive Handbook" 2nd edition, Robert Bosch GmbH, 1986, page 305, see appendix A for example. As shown, there are many firing order options for a V-6 engine, and none are in the order that follows the labeling of Figure 1 of Voss et al.

Also, in rejecting claim 8, the Examiner goes on to state that Voss et al. shows "...selecting between said third and said forth modes of operation during a crank angle interval where valves in said first cylinder group are opened and closed, and activating said selected mode (see column 3, lines 1 to 9)". Applicant has reviewed the Examiner's citation and can find no mention of selecting between modes of operating during a crank angle interval where the valves of another cylinder group are opened and closed. Applicant finds in column 3, line 3 and 4, that Voss et al. state that "The charge-changing valves 10 are operated as a function of rpm and/or load". There is no support in the citation that teaches one to switch valve operating modes in one cylinder group based on the operating conditions of another cylinder group.

Applicant, on the other hand, has recognized that by grouping cylinders that are consecutive in a combustion sequence, a larger mode transition window may be created. Consequently, Applicant has developed an engine and a method that reduces the possibility of valve degradation when switching between valve modes. Furthermore, Applicant's engine and method may improve engine operation by reducing the possibility of lack of coordination between valve lift and inducted air amount, see Applicant's specification page 10, lines 2-7, for example.

Therefore, Applicant respectfully submits that claim 8 should be allowed. In addition, claims 12 and 13 depend from claim 8 and should be allowed on the same basis. Furthermore, claims 14-17 recite similar limitations and should be allowed as well.

**Rejection of Claims 9-11, 18-20 under 35 U.S.C. 103(a)**

The Examiner has rejected claims 9-11, 18-20 under U.S.C. 103(a) as being obvious by Voss et al. in view of Davis et al., U.S. Patent 6,474,278. As described above, the claims relate to cylinders "that are consecutive in a combustion sequence", a limitation not shown in the Voss et al. reference. In addition, Applicant can find no mention in Davis et al. to suggest grouping of cylinders by a combustion sequence. As such, taken individually or in combination, the references cited by the Examiner fail to show all of Applicant's limitations. Therefore, Applicant submits that claims 9-11 and 18-20 should be allowed.

**Conclusion**

Based on the above mentioned arguments, the above-identified applicant is believed to be in condition for allowance, and such allowance is courteously solicited.

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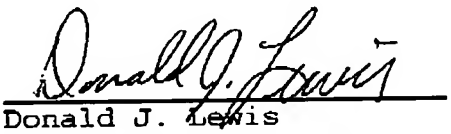
Respectfully submitted,



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